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PILLSBURY WINTHROP, LLP
P.O. BOX 10500
MCLEAN, VA 22102

EXAMINER	
RYMAN, DANIEL J	

ART UNIT	PAPER NUMBER
2665	

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7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/577,502	Applicant(s) STAHLE ET AL.	
	Examiner Daniel J. Ryman	Art Unit 2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-5,8-14,17 and 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-5,8-14,17 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 4/27/2004 have been fully considered but they are not persuasive. On pages 12-13 of the Response, Applicant argues that the cited prior art fails to teach the newly added limitations. Examiner, respectfully, disagrees. As outlined in the rejection below, Examiner asserts that the cited prior art contains or suggests each and every limitation of the claims.

2. On page 13, Applicant argues that the beam forming circuitry 224 is separate from the rake branches. Examiner, respectfully, disagrees. While Antonio discloses that the beam forming circuitry can occur before the rake branch, Antonio also discloses that the beam forming circuitry can be part of the rake branch (see Fig. 5c and 5d) where the rake branch is broadly defined to be the beam former and the correlation receiver. Thus, Examiner maintains that, as broadly defined, Antonio discloses that the beam forming circuitry can be contained in the rake branch.

3. In addition, Applicant argues that the control and adjustment of the beams occurs outside of the rake branches. Examiner, agrees, which is why Examiner has combined Antonio with knowledge generally available to one of ordinary skill in the art. Specifically, Examiner combines Antonio with a teaching that distributed control is well known in the art as a way to eliminate the need for an expensive central controller. Thus, Examiner asserts that Antonio combined with knowledge generally available to one of ordinary skill in the art discloses that the control and adjustment can occur inside of the rake branches.

4. Applicant goes on to argue on page 13 that Antonio does not disclose separate beam formers and correlators for the I and Q branches. Examiner agrees that Antonio does not

expressly disclose separate beam formers and correlators for the I and Q branches; however, as seen in Fig. 8, Antonio does disclose that the I and Q branches are processed separately. Therefore, Examiner asserts that Antonio suggests that the I and Q branches have separate beam formers and correlators since the I and Q branches are processed separately.

5. On page 14, Applicant argues that Popovic and El-Tarhuni fail to remedy the aforementioned deficiencies of Antonio. Given the above arguments, Examiner submits that Antonio does not need Popovic and El-Tarhuni to remedy the aforementioned deficiencies since Antonio does not contain the aforementioned deficiencies. As such, Examiner maintains the rejections of the claims. Examiner urges Applicant to add limitations to the claims in order to distinguish the claims from the cited prior art.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 3-5, 11, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al (USPN 5,621,752) in view of Popovic et al (USPN 6,370,397).

8. Regarding claims 1 and 13, Antonio discloses a receiver for receiving a signal of a desired user, which signal may arrive at the receiver in different components along several different paths at several different delays (Fig. 2 and col. 4, lines 22-35), the receiver comprising: an antenna array composed of more than one element for receiving the signal (col. 2, line 55-col. 3, line 5; col. 3, lines 59-col. 4, line 50; and col. 6, lines 26-33), one or more rake branches for

demodulating the received signal (col. 2, line 55-col. 3, line 5; col. 4, lines 36-61; col. 8, lines 3-19; and col. 10, line 15-col. 11, line 25), at least one search branch adapted to search for incoming directions and delays of components of the received signal (col. 3, line 59-col. 4, line 7; col. 7, lines 8-37; col. 7, line 46-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and to transmit information indicating a most favorable signal component demodulated by the one or more rake branches (col. 8, line 32-col. 9, line 5), and in which at least one rake branch includes a plurality of beam formers including a first beam former (col. 6, lines 48-col. 7, line 37; col. 7, lines 48-66; and col. 10, line 15-col. 11, line 25), a plurality of correlators including a first correlator and being respectively coupled to the outputs of the beam formers (col. 7, lines 48-66; col. 8, line 3-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and a demodulator coupled to the outputs of the plurality of correlators (col. 2, line 55-col. 3, line 5; col. 4, lines 36-61; col. 8, lines 3-19; and col. 10, line 15-col. 11, line 25), a code generator for generating the codes required by the plurality of correlators (col. 3. line 59-col. 4, line 7 and col. 4, lines 51-61). Antonio does not expressly disclose that the each rake branch contains control means; however, Antonio does disclose control means adapted to control the operation of the code generator and the plurality of beam formers via at least one control signal (col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), by which control means, information is received from the search branch about the incoming direction and delay of the most favorable signal component (col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and calculation means whose inputs include the outputs of the plurality of correlators, the calculation means being adapted to calculate and transmit to the control means, on the basis of the outputs of the plurality of correlators, information on how the code generator and the

plurality of beam formers are to be controlled to ensure that the first beam former and the first correlator receive the most favorable signal component via the direction and delay calculated for this purpose (col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), wherein the plurality of correlators included in the at least one rake branch are adapted to calculate a correlation from a calculated incoming direction and from left and right sides of that incoming direction of that at least one rake branch (col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and wherein the calculation means are adapted to calculate a control signal for controlling the beam formers such that, if the correlation result calculated from the left or right side of the incoming direction is higher than the correlation result obtained from the calculated incoming direction, the first beam former is controller to receive the signal from the left or right side of the incoming direction having the higher correlation result (col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25). Examiner takes official notice that distributed control means are well known in the art since distributing the control functions eliminates the need for an expensive central controller. It would have been obvious to one of ordinary skill in the art at the time of the invention to have each rake branch contain control means since distributing the control functions eliminates the need for an expensive central controller. Antonio does not expressly disclose that the two-dimensional impulse response of the received signal is calculated by searching for the incoming directions and delays of the received signal components. Popovic teaches, in a system for receiving a multipath signal, "if an ideal pulse is transmitted over a multipath channel, the received corresponding signal appears as a stream of pulses, each pulse or path having a corresponding different time delay, as well as different amplitude and phase. Such a complex

received signal is usually called the channel impulse response" (col. 1, lines 36-49). It would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the two-dimensional impulse response of the received signal by searching for the incoming directions and delays of the received signal components since the impulse response is defined as the incoming directions and delays of the received signal components.

9. Regarding claims 3 and 14, referring to claims 1 and 13, Antonio in view of Popovic discloses controlling the code generator and the beam formers such that the correlation value indicated by the output signal of the correlator to which the signal received from the desired direction has been applied is as high as possible (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

10. Regarding claim 4, referring to claim 2, Antonio in view of Popovic discloses a calculation means adapted to calculate for the code generator a phase change and for the beam formers an angular change, such that the correlation value indicated by the output signal of the first correlator is as high as possible (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

11. Regarding claim 5, referring to claim 1, Antonio in view of Popovic suggests a calculation means adapted to calculate control information for the code generator and the beam formers at predetermined intervals (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25).

12. Regarding claim 11, Antonio discloses a receiver for receiving a signal of a desired user, which signal may arrive at the receiver in different components along several different paths at several different delays (Fig. 2 and col. 4, lines 22-35), the receiver comprising: an antenna array

composed of more than one element for receiving the signal (col. 2, line 55-col. 3, line 5; col. 3, lines 59-col. 4, line 50; and col. 6, lines 26-33), one or more rake branches for demodulating the received signal (col. 2, line 55-col. 3, line 5; col. 4, lines 36-61; col. 8, lines 3-19; and col. 10, line 15-col. 11, line 25), at least one search branch adapted to search for incoming directions and delays of components of the received signal (col. 3, line 59-col. 4, line 7; col. 7, lines 8-37; col. 7, line 46-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and to transmit information indicating a most favorable signal component demodulated by the one or more rake branches (col. 8, line 32-col. 9, line 5), and in which at least one rake branch includes a plurality of beam formers (col. 6, lines 48-col. 7, line 37; col. 7, lines 48-66; and col. 10, line 15-col. 11, line 25), and a plurality of correlators being respectively coupled to the outputs of the beam formers (col. 7, lines 48-66; col. 8, line 3-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and a demodulator coupled to the outputs of the plurality of correlators (col. 2, line 55-col. 3, line 5; col. 4, lines 36-61; col. 8, lines 3-19; and col. 10, line 15-col. 11, line 25), a code generator for generating the codes required by the plurality of correlators (col. 3. line 59-col. 4, line 7 and col. 4, lines 51-61). Antonio does not expressly disclose that the each rake branch contains control means; however, Antonio does disclose control means adapted to control the operation of the code generator and the plurality of beam formers via at least one control signal (col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), by which control means, information is received from the search branch about the incoming direction and delay of the most favorable signal component (col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25), and calculation means whose inputs include the outputs of the plurality of correlators, the calculation means being adapted to calculate and transmit to the

control means, on the basis of the outputs of the plurality of correlators, information on how the code generator and the plurality of beam formers are to be controlled (col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25). Examiner takes official notice that distributed control means are well known in the art since distributing the control functions eliminates the need for an expensive central controller. It would have been obvious to one of ordinary skill in the art at the time of the invention to have each rake branch contain control means since distributing the control functions eliminates the need for an expensive central controller. Antonio does not expressly disclose that the two-dimensional impulse response of the received signal is calculated by searching for the incoming directions and delays of the received signal components. Popovic teaches, in a system for receiving a multipath signal, "if an ideal pulse is transmitted over a multipath channel, the received corresponding signal appears as a stream of pulses, each pulse or path having a corresponding different time delay, as well as different amplitude and phase. Such a complex received signal is usually called the channel impulse response" (col. 1, lines 36-49). It would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the two-dimensional impulse response of the received signal by searching for the incoming directions and delays of the received signal components since the impulse response is defined as the incoming directions and delays of the received signal components. Antonio also does not expressly disclose that different beam formers and correlators in the at least one rake branch are respectively used for signals of branch I and Q; however, Antonio does disclose that the I and Q branches are processed separately (Fig. 8 and col. 13, line 36-col. 14, line 34). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to have different beam formers and correlators in the at

least one rake branch are respectively used for signals of branch I and Q since the I and Q branches are processed separately.

13. Claims 8, 9, 12, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al (USPN 5,621,752) in view of Popovic et al (USPN 6,370,397) as applied to claims 1 and 13 above, and further in view of El-Tarhuni et al (USPN 6,201,828).

14. Regarding claims 8 and 17, referring to claims 1 and 13, Antonio in view of Popovic does not expressly disclose calculating the correlation before and after the calculated delay of the most favorable signal component. El-Tarhuni teaches, in a system for receiving a multipath signal of a desired user, calculating the correlation before and after the calculated delay of the most favorable signal component in order to track transmission delay at low cost and with low complexity (Fig. 3; col. 2, lines 36-45; col. 2, lines 48-62; and col. 3, lines 20-62). It would have been obvious to one of ordinary skill in the art at the time of the invention to calculate the correlation before and after the calculated delay of the most favorable signal component in order to track transmission delay at low cost and with low complexity.

15. Regarding claims 9 and 18, referring to claims 8 and 17, Antonio in view of Popovic in further view of El-Tarhuni discloses that the code generator is so controlled that if the correlation result calculated before or after the calculated delay of the most favorable signal component is higher than the correlation result obtained from the calculated delay, the code generator is operative to shift code phase to a phase before or after the calculated delay (Antonio: Fig. 5d; col. 3, line 59-col. 4, line 7; col. 8, line 32-col. 9, line 5; and col. 10, line 15-col. 11, line 25 and El-Tarhuni: Fig. 3; col. 2, lines 36-45; col. 2, lines 48-62; and col. 3, lines 20-62).

16. Regarding claim 12, referring to claim 11, Antonio in view of Popovic possibly does not disclose a code generator that generates the following codes having different phases: on-time I, on-time Q, late I, early Q. El-Tarhuni teaches, in a system for receiving a multipath signal of a desired user, having a code generator that generates the following codes having different phases: on-time I, on-time Q, late I, early Q in order to track transmission delay at low cost and with low complexity (Fig. 3; col. 2, lines 36-45; col. 2, lines 48-62; col. 3, lines 20-62; and col. 5, lines 1-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to have a code generator that generates the following codes having different phases: on-time I, on-time Q, late I, early Q in order to track transmission delay at low cost and with low complexity.

17. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Antonio et al (USPN 5,621,752) in view of Popovic et al (USPN 6,370,397) as applied to claim 1 above, and further in view of Lomp et al (USPN 6,272,168).

18. Regarding claim 10, referring to claim 1, Antonio in view of Popovic discloses that, for each branch of the rake receiver, the noise level is calculated in the incoming direction of the desired signal component in order to determine SNR (col. 10, lines 31-67) where it is implicit that calculating SNR requires knowledge of the noise level. Antonio in view of Popovic does not expressly disclose that the at least one rake branch includes a noise code generator and a plurality of correlators which are coupled to the outputs of the beam formers wherein inputs of the respective correlators are coupled to the output of the noise code generator, the at least one rake branch further including a demodulator coupled to the respective outputs of the correlators, the demodulator being adapted to calculate noise level from the calculated incoming direction of the

most favorable signal component. Lomp teaches, in a CDMA system, that a noise level can be determined by a noise code generator and a number of correlators (col. 21, lines 9-18) where it is implicit that the noise level can be calculated with equipment already present in the receiver. It would have been obvious to one of ordinary skill in the art at the time of the invention to have the at least one rake branch include a noise code generator and a plurality of correlators which are coupled to the outputs of the beam formers wherein inputs of the respective correlators are coupled to the output of the noise code generator, the at least one rake branch further including a demodulator coupled to the respective outputs of the correlators, the demodulator being adapted to calculate noise level from the calculated incoming direction of the most favorable signal component in order to calculate the noise level for the incoming signal using only equipment already present in the receiver for the purpose of finding the signal with the highest SNR.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Martin et al (USPN 6,324,160) see entire document which pertains to an adaptive receiver. Chang et al (USPN 6,320,899) see entire document which pertains to a two-dimensional demodulator in CDMA system.

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Ryman whose telephone number is (703)305-6970. The examiner can normally be reached on Mon.-Fri. 7:00-5:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (703)308-6602. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel J. Ryman
Examiner
Art Unit 2665

DJR

Daniel J. Ryman

HUY D. VU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600